International Journal of Scholarly Research (IJSR)
Vol-1, Issue-3, 2017
http://www.scholars.org.in

"Implementation of Unimodal to Multimodal Biometric Feature Level Fusion of Combining Face Iris and Ear in Multi-Modal Biometric System"

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***Abstract*:** In this paper is on combining the features face ear and iris to single modal to multimodal combine of the obtain better accuracy improvement as compared to the privies system. The paper discusses a new research area to introduce ear as the feature for multimodal biometric our system is to implement a multimodal an multialgorithmic biometric system combining Ear iris and Face recognition. We have developed the secure facial features based authentication system Multi modal biometric system is one of the major areas of study identified with large applications in recognition system. Single modal-biometric systems have to challenge with a variety of problems such as noisy data, intra-class variations, non universality and unacceptable error rates. Some of these limitations can be solved with multi modal Biometric systems. In this paper we are going implement a multi modal biometric system combining the feature of face iris and ear modalities to obtain better accuracy as compared to the privies based system.

Keyword: Multi-biometrics, Biometrics, Fusion level, Feature extraction, PCA, SVM.

I. INTRODUCTION

Biometric recognition technology can be widely used in the field of authentication, security, human computer interaction system, criminal identification and investigation, security. Unimodal biometric recognition system variety of problem such as the problem to solved can be overcome by employing multimodal biometric system used

Biometrics:

Automated recognition of individuals based on their behavioural and biological characteristics is called biometrics. Some examples of biometric characteristics are fingerprint, iris, face (2D and 3D), retina, palm print, hand veins, ear, knuckles, DNA, voice, signature, gait, typing patterns, etc. These characteristics are denoted as biometric traits or modalities. Since the biometric traits are intrinsically bound to the person, they can be used to establish his identity with high degree of confidence.

Multi-biometrics:

An important development in the field of biometrics is to combine information from multiple biometric sources (i.e., cues). A system that consolidates the evidence presented by multiple biometric cues is known as a multi-biometric system. Multi-sensor – in which, more than one sensors are used to capture information from the presented biometric trait (e.g., capacitive and optical sensors for fingerprints). Multi-sample – when more than one recording of the biometric trait is used (e.g., multiple face images can be used for creating the template). Multi-algorithmic – where the same biometric data is processed through multiple algorithms (e.g., minutiae and texture based features for fingerprints). Multi-unit or multi-instance – in which, multiple instances of the same biometric trait are used (e.g., information from images of left and right irises is combined) Multi-modal – when more than one biometric traits are used (e.g., a combination of iris and face). The problem of consolidation of information presented by multiple biometric sources or cues from any of the types mentioned above is known as information fusion. The information fusion in a biometric system can be carried out at different levels. **Sensor Level** – Information coming from different sensors is combined. **Feature Level** – The biometric information extracted in form of features is combined. **Score Level** – Match scores of individual biometric comparisons are combined. **Decision Level** – The results of individual biometric comparisons are combined.

Rank Level – When the output of each biometric system is a subset of possible matches (i.e., identities) sorted in decreasing order of confidence, the fusion can be done at the rank level. This is relevant in an identification system where a rank may be assigned to the top matching identities.

Overall multi-modal biometrics system based on face, iris and ear could their connection relationship of physiological and biological location. It would significantly improve accuracy. Multi-modal biometrics based on face and ear is expected to make a breakthrough in the field of biometrics In this paper we first the overcome the disadvantage unimodal to multimode biometric system. And the combining multimodal biometric based on face and ear and the discuss new research area .finally find to better accuracy in this paper.

II. RELATED WORK

In this section we analysis previously done research work on biometrics system and there different types of biometrics as

well as previously work done on multi-modal biometric systems with different algorithms and design. The summarizing review of earlier done related work is as follows.

Kirti V. Awalkar, Sanjay G. Kanade, Dattatray V. Jadhav, Pawan K. Ajmera [1] have build a multi-modal and multi algorithmic biometric system by combining iris and face. The iris features are extracted using the Daugman's algorithm which results in binary features. For face have used two types of Features: Gabor filters based and Local Binary Patterns (LBP) based. They have performed broad experiments to estimate the system on widely available databases using regular well defined protocols.

Lin Zhang, Lida Li, Hongyu Li, and Meng Yang[2] have proposed a new method for 3D ear identification, that is LCKSVD_LHST. There donations are mainly from two aspects. They have get used to LC-KSVD, a state-of-the-art model for supervised dictionary learning, to the relevance of 3D ear recognition. Second aspect is for feature extraction, they have proposed an approach based on local histograms of STs, which is quite helpful and strong to small placement errors. They have achieved higher recognition rate than the other competitors evaluated. And apart from all this its computational difficulty is extremely low at the test stage, manufacturing it quite appropriate for large-scale identification applications.

Gandhimathi Amirthalingam, Radhamani.[3] have projected framework of the multimodal biometric system using face and ear. They have also discusses the levels of fusion that are promising and appreciate the types of difficulties focused by previous research work in this area.

Javier Galbally, Sébastien Marcel, Julian Fierrez[4] have present a new software-based fake detection method that can be used in multiple biometric systems to detect different types of fraudulent unauthorized access attempts which is made by third party for wanting the access of some precious system information or some other important thing. They have set the objective of proposed system is to improve the security of biometric recognition architecture, by adding liveness evaluation in a fast, user friendly, and non-intrusive manner, through the use of image quality assessment.

Teddy Ko[5] have overviews and discusses the various scenarios that are possible in multimodal biometric systems using fingerprint, face and iris recognition, the levels of fusion that are possible and the integration strategies that can be adopted to fuse information and improve overall system accuracy.

A.A. Darwish, R. Abd Elghafar and A. Fawzi Ali [6] have present study has designed to build up a multimodal biometric system for personal identification. Investigational results have shown that integrated face and ear recognition system. He has implemented this system at different database. At the end he got result and concludes that combining face and ear is a good method because it offers a high precision and security.

Snehlata Barde, A. S. Zadgaonkar, G. R. Sinha[7]have shows, PCA, Hamming Distance based multimodal biometrics has been existing using faces ears and iris modalities for self produced databases. Multimodal biometrics has resulted enhanced performance in provisions of recognition accurateness, FAR and FRR.

R. Brunelli and D. Falavigna [8] have proposed Multimodal systems combine the verification presented by different body character for creating and establishing identity. They has proposed a multimodal biometric systems utilized face and voice features to devlop the identity of an individual. actually uncorrected traits (e.g., fingerprint and iris) are expected to result in better development in performance than associated traits (e.g. voice and lip movement).

III. MULTIMODAL BIOMETRIC FOR FEATURE LEVEL FUSION FACE IRIS AND EAR TO COMBINE UNIMODAL

The input images it first given to Viola Jones detection where the face extraction if face are not found when a new images taken at the input else the face is the process wired created object detection to find out the eyes of the input face. Once the eyes are extracted then we will use facial geometry to find out the electronic of eyes, face, fingerprint, etc. Once face, eyes and ear are extracted then to find out of feature of the face, eyes and ear. The find out mainly the structure property of all the components .For any new images SVM classified apply in order to get the classification images.

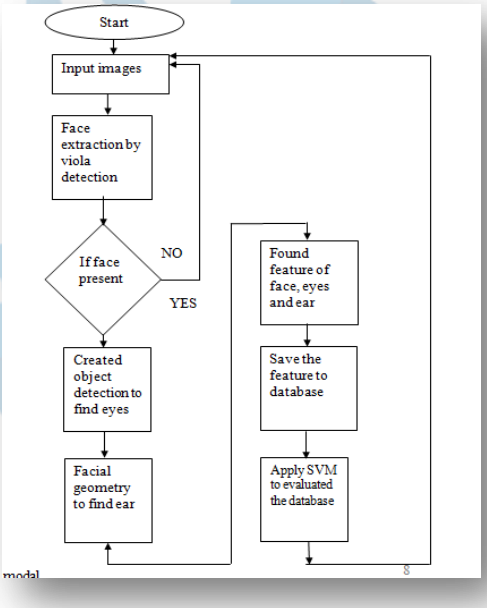
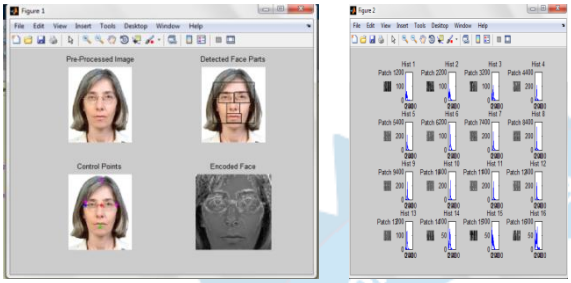


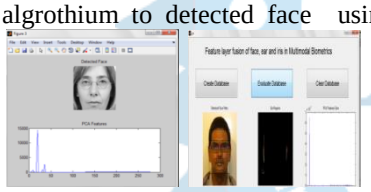
Fig: Flow diagram of system modal

In our proposed methodology there are major six step are to be followed**:**

1. **Created the database**: first the created database for the input images saved the database **for 100** person enters and more than enteric.
2. **Pre-processing**
   Pre-processing the second step is the pre-processing Detected the face path and then apply control point and encoding the face path. The control point and the boundary box to used the PCA and histogram algrothium



3. **PCA:** PCA is one of the most popular face recognition algrothium is used the database for the purpose the work contain train subject and test subject test biometric used face and ear .first the input images to face presented than pre-pressing detected face path for control point to images to encoding face for histogram algrothium to detected face using the PCA feature.



4. **Created GUI:**

   Graphic user interface created and the created database for matching person identification and evaluation database face and ear. combine mapping and person name to save to the database To the feature level combine fusion face ,eyes and ear. input the 10 images and the testing to find corrected output.

5 .matching: decision is the matching verification of the person for multimodal biometric system various system to used and various algrothium to use PCA, for feature extraction, viola Jones face detect SVM classification used. first to the input images than images extracted tested and than corrected output and than to find accuracy to compare the privies system and unimodal to find the accuracy to implementation of the better accuracy find out of them.

IV. Experimental and results setup:

of enter in database	of images extracted tested (B)	of correct output (C)	(C)/(B)
5	3	2	2/3*100= **66.66%**
10	10	8	8/10*100=**80%**
20	20	17	17/20*10=**85%**
30	30	27	27/30*100=**90%**
40	40	37	37/40*100=**92.5%**
50	50	47	47/50*100=**94%**
60	60	57	57/60*100=**95%**
70	70	66	66/70*100=**98.57%**
80	80	79	79/80*100=**98.75%**
90	90	89	89/90*100=**98.88%**
100	100	99	99/100*100=**99%**

Table 1: Face, Iris and Ear

Number of enter in database	Number of images extracted tested (B)	Number of correct output (C)	Accuracy (C)/(B)
10	10	8	8/10*100=80%
20	20	17	17/20*100=85%
30	30	27	27/30*100=90%
40	40	38	38/40*100=95%
50	50	48	48/50*100=96%
60	60	58	58/60*100=96.66%
70	70	69	69/70*100=98%
80	80	79	79/80*100=98.75%

Table 2: face and iris

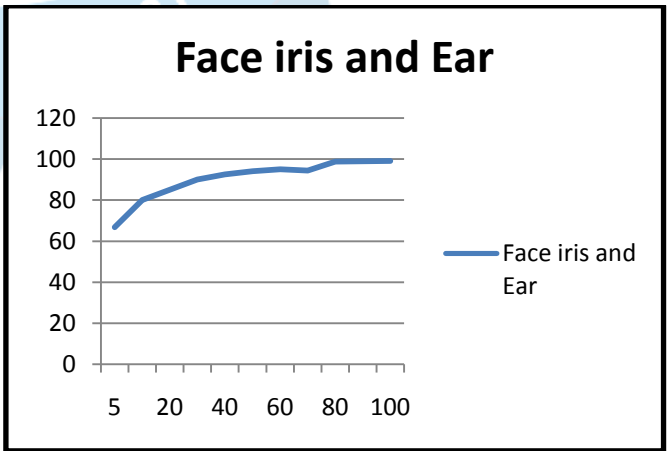


Fig 1: face iris and ear

Number	Number	Number	Accuracy

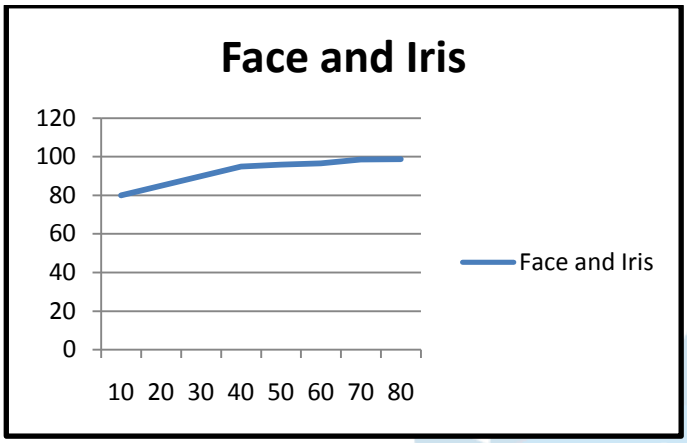


Fig 2: face and iris

V. CONCLUSION

Overall accuracy of Ear -Face facial biometric authentication system. Will be evaluated and tested under various facial images. Developed an various algorithm which combines features from human Iris, Ear and Face for person verification. .We achieved significant improvement in the verification performance. improved recognition accuracy compared to unimodal and privies system

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